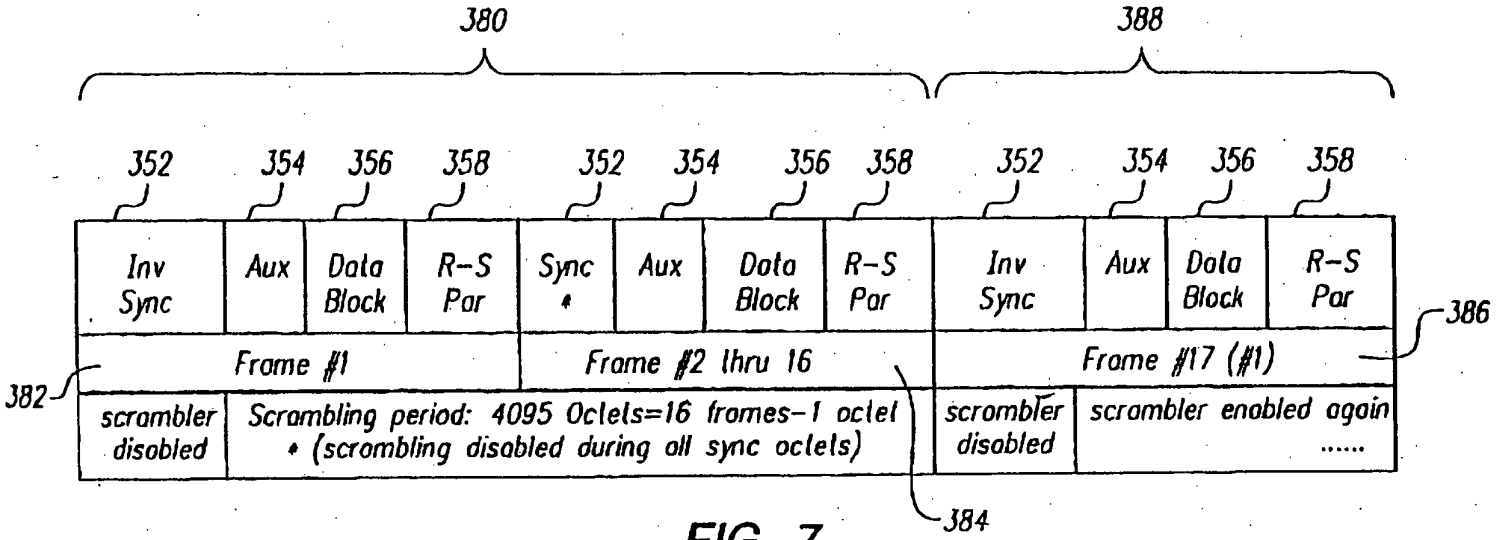


FIG. 7

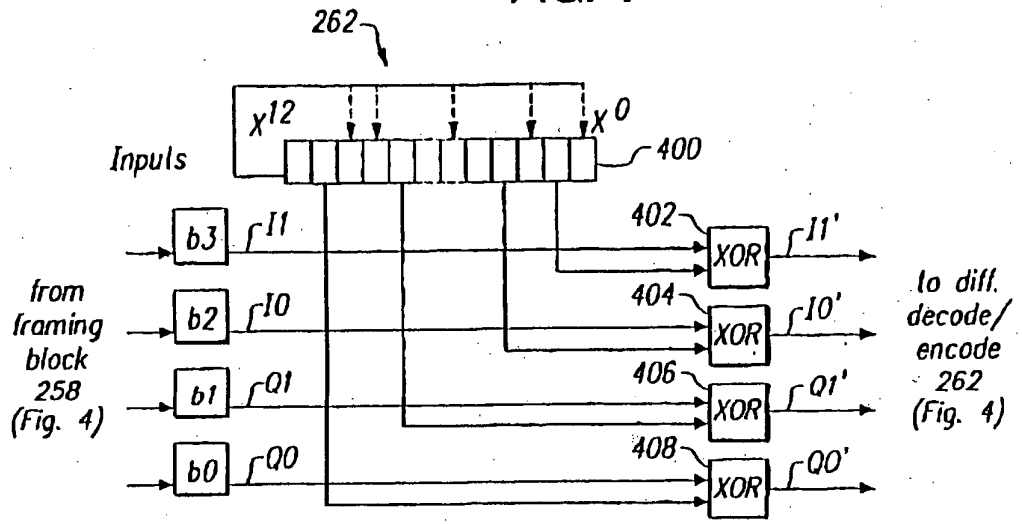


FIG. 8

```
Quad  = 2*I1'+Q1';          - Map Quadrant Tag [0 1 2 3]
Phi   = [0 1 3 2] ;         - to Angle = [0 1 2 3]
Angle = Phi(Quad)
Sum   = (Sum+Angle)modulo 4 ;
I1"   = bit 1 of Sum ;  I0"   = I0';
Q1"   = bit 0 of Sum ;  Q0"   = Q0';
```

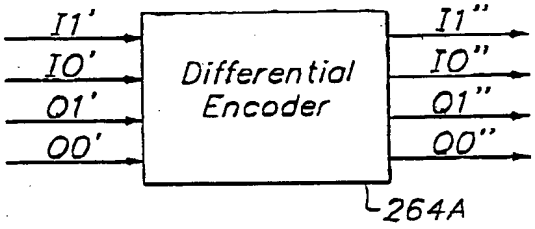


FIG. 9

```
Angle = 2*RxIs'+ RxQs' ;
Phi'  = [0 1 3 2] ;
Diff  = (Phi'(Angle)-Phi0) modulo 4 ;
Phi0  = Phi'(Angle) ;
RxIs  = bit 1 of Phi'(Diff) ;  RxIm = RxIm' ;
TxIs  = bit 0 of Phi'(Diff) ;  RxQm = RxQm' ;
```

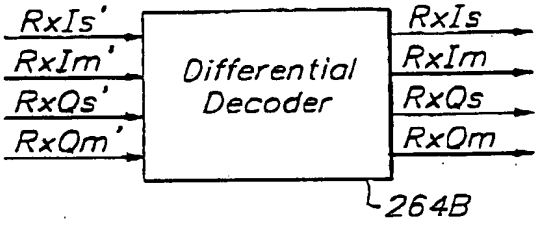
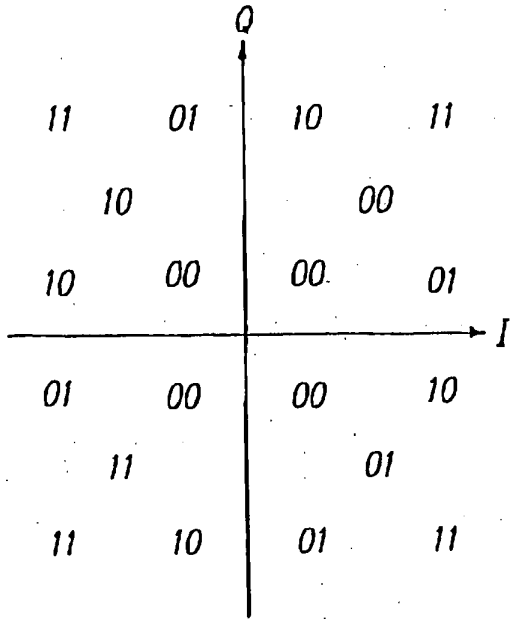


FIG. 10

FIG. 11



Normal Font
I0",Q0"

Bold Font
I1",Q1"

Input Symbols
Shown in Output
Symbol Position

Xs,Xm outputs are
(00,01,10,11)
left–right, bottom–top
(offset binary format)

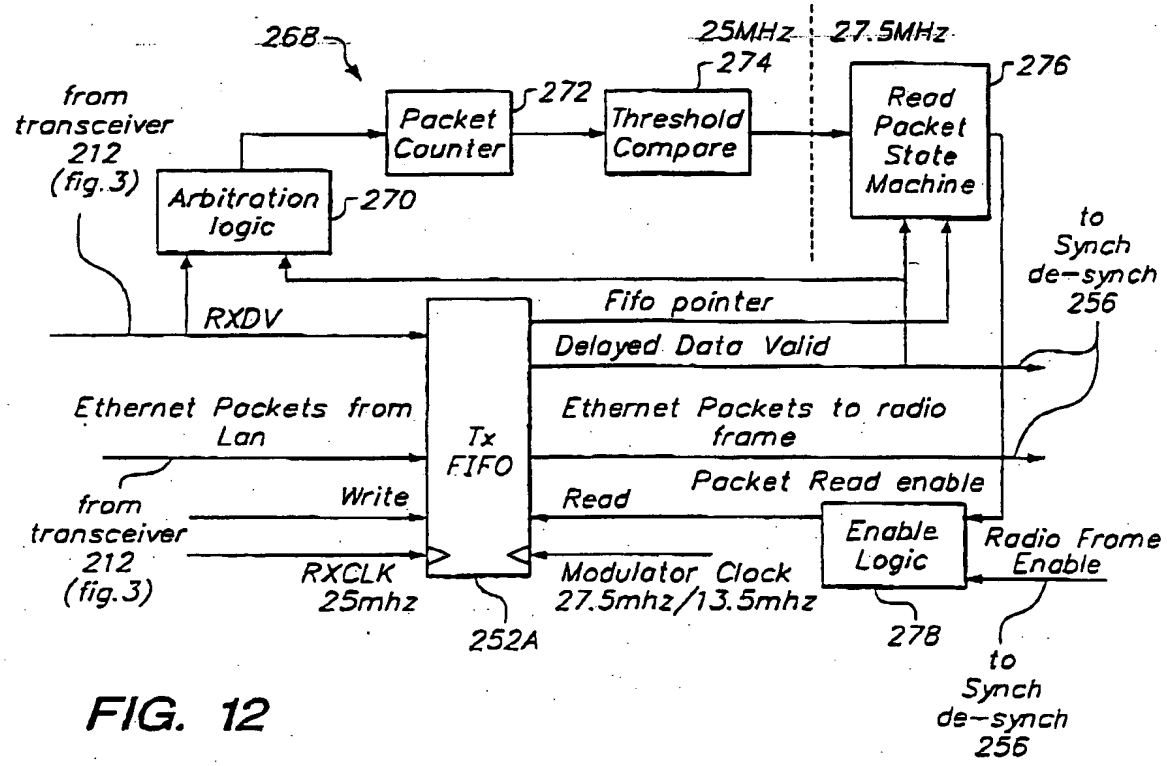

268
25MHz
27.5MHz
274
276
from transceiver 212 (fig.3)
Packet Counter
272
Threshold Compare
Read Packet State Machine
Arbitration logic
270
to Synch de-synch 256
RXDV
Fifo pointer
Delayed Data Valid
Ethernet Packets from Lan
Tx FIFO
Ethernet Packets to radio frame
Packet Read enable
from transceiver 212 (fig.3)
Write
Read
Enable Logic
Radio Frame Enable
RXCLK 25mhz
Modulator Clock 27.5mhz/13.5mhz
252A
278
to Synch de-synch 256

FIG. 12

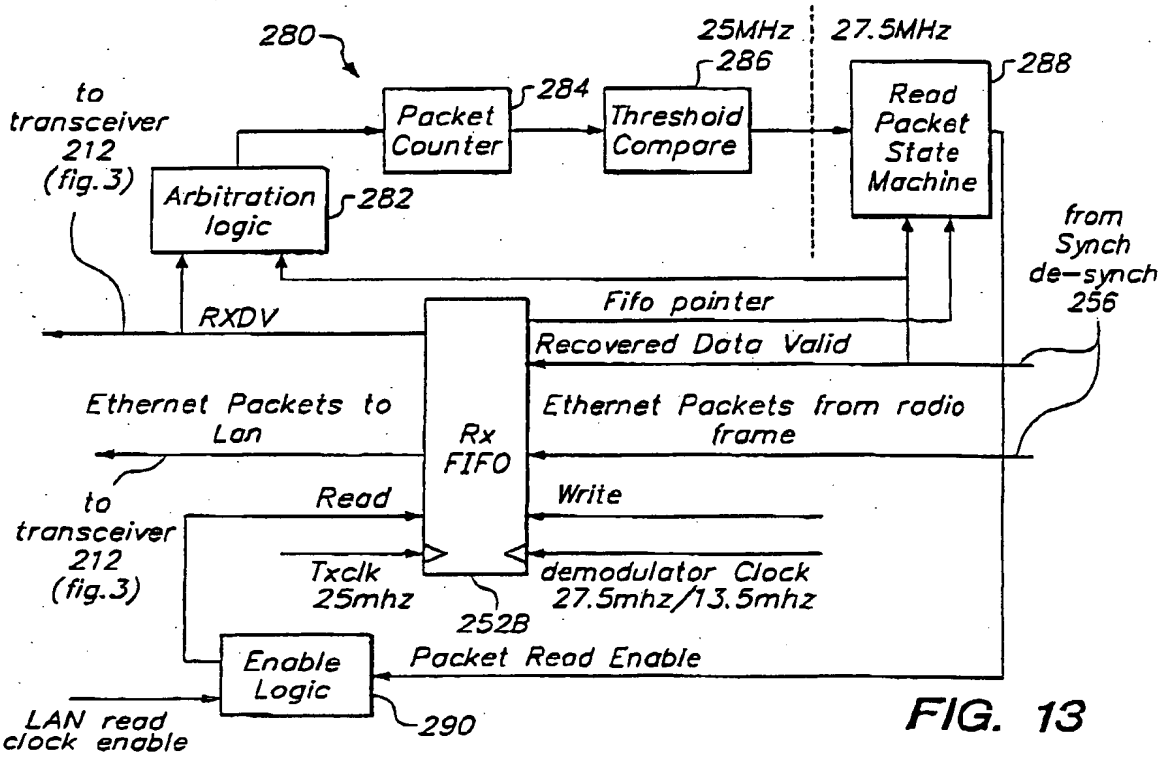

280
25MHz
27.5MHz
286
288
to transceiver 212 (fig.3)
Packet Counter
284
Threshold Compare
Read Packet State Machine
Arbitration logic
282
from Synch de-synch 256
RXDV
Fifo pointer
Recovered Data Valid
Ethernet Packets to Lan
Rx FIFO
Ethernet Packets from radio frame
to transceiver 212 (fig.3)
Read
Write
Txclk 25mhz
demodulator Clock 27.5mhz/13.5mhz
252B
Enable Logic
Packet Read Enable
LAN read clock enable
290

FIG. 13

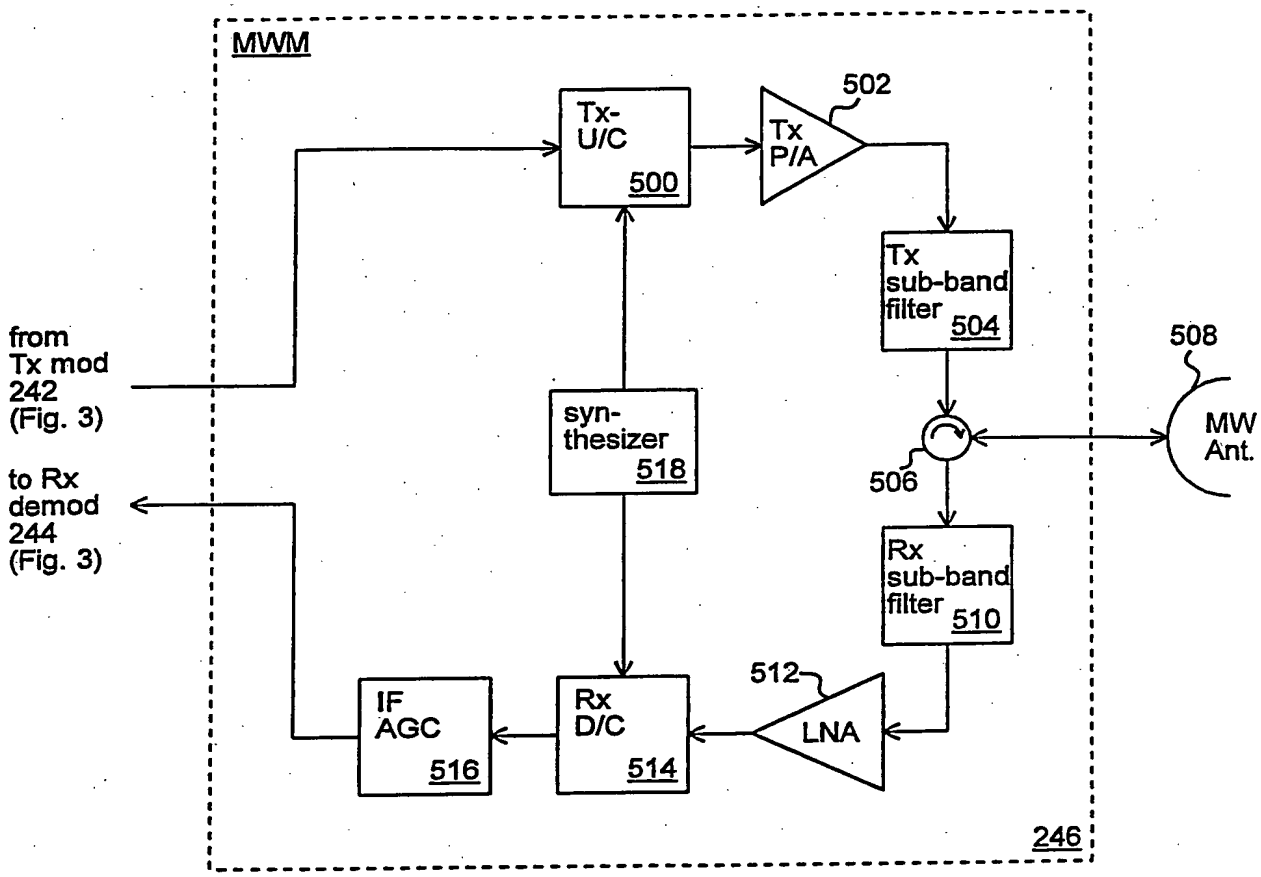

MWM
Tx-
U/C
500
502
Tx
P/A
Tx
sub-band
filter
504
508
MW
Ant.
from
Tx mod
242
(Fig. 3)
to Rx
demod
244
(Fig. 3)
syn-
thesizer
518
506
Rx
sub-band
filter
510
512
LNA
Rx
D/C
514
IF
AGC
516
246

Fig. 14

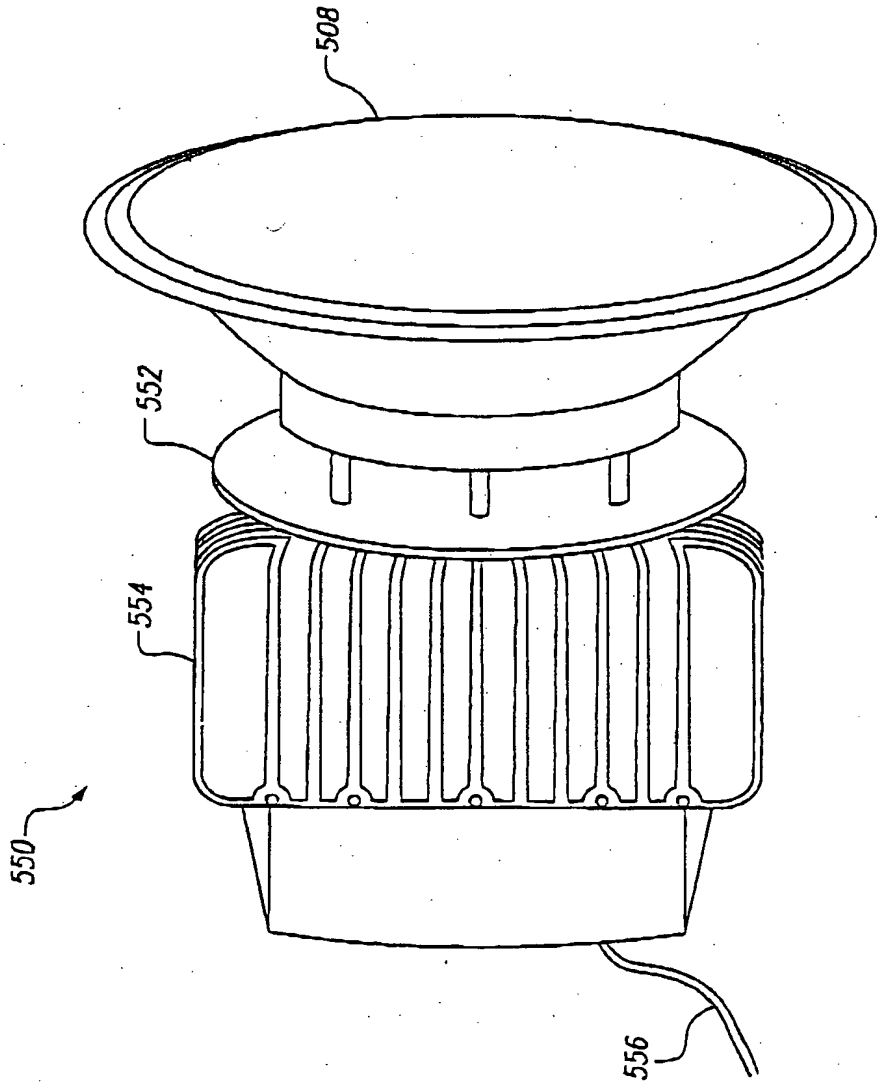


FIG. 15

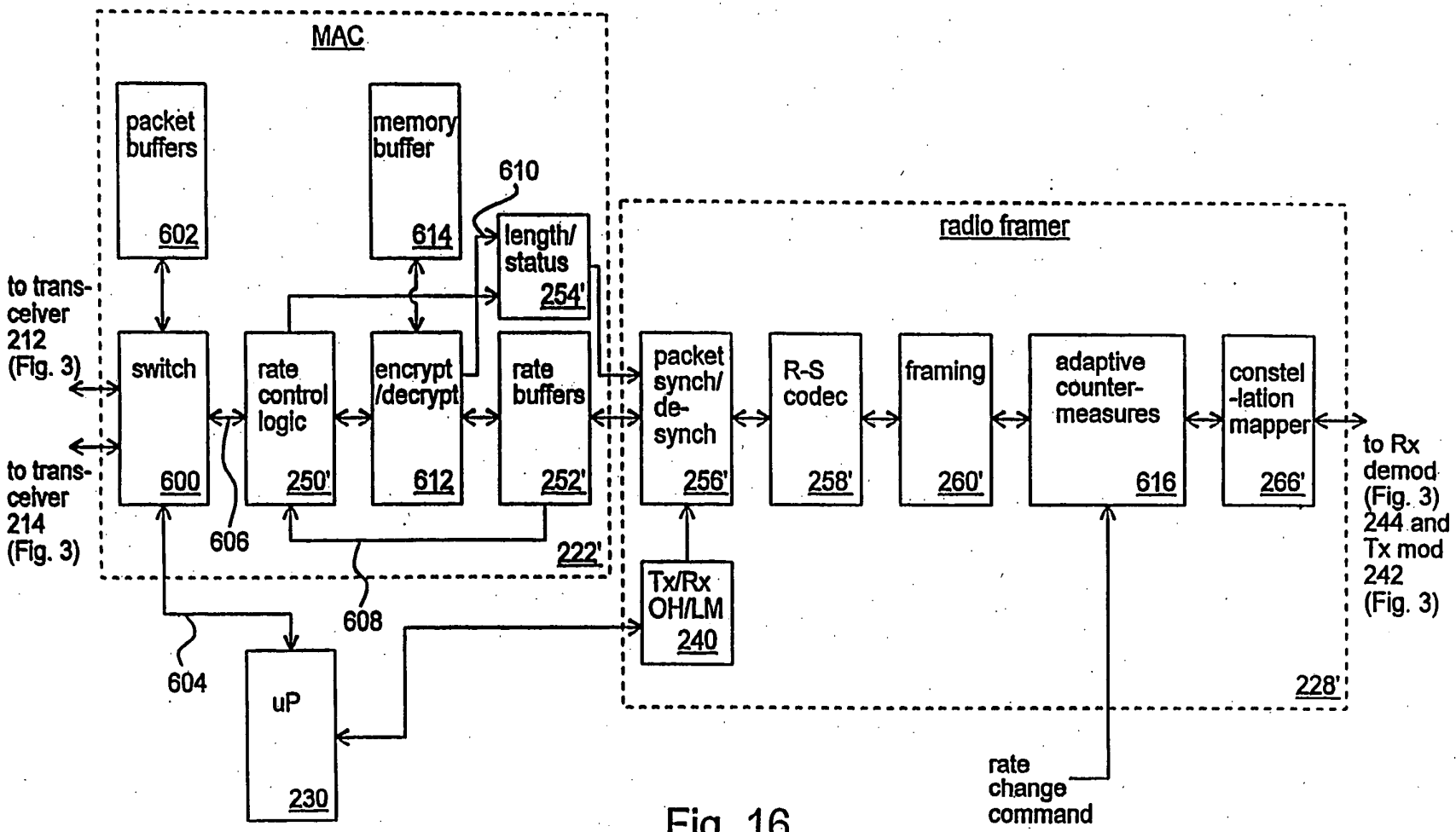

MAC
packet buffers
602
memory buffer
614
610
length/ status
254'
to trans-ceiver 212 (Fig. 3)
switch
600
rate control logic
250'
encrypt /decrypt
612
rate buffers
252'
606
222'
to trans-ceiver 214 (Fig. 3)
608
604
uP
230
radio framer
packet synch/ de-synch
256'
R-S codec
258'
framing
260'
adaptive counter-measures
616
constel -lation mapper
266'
to Rx demod (Fig. 3) 244 and Tx mod 242 (Fig. 3)
Tx/Rx OH/LM
240
228'
rate change command

Fig. 16

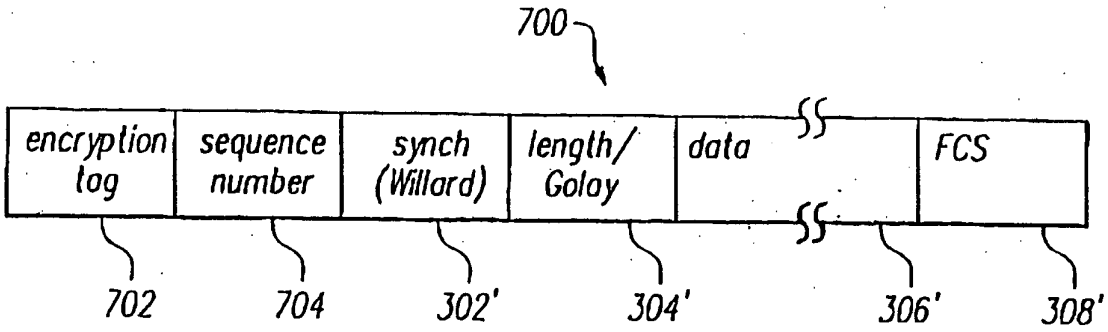
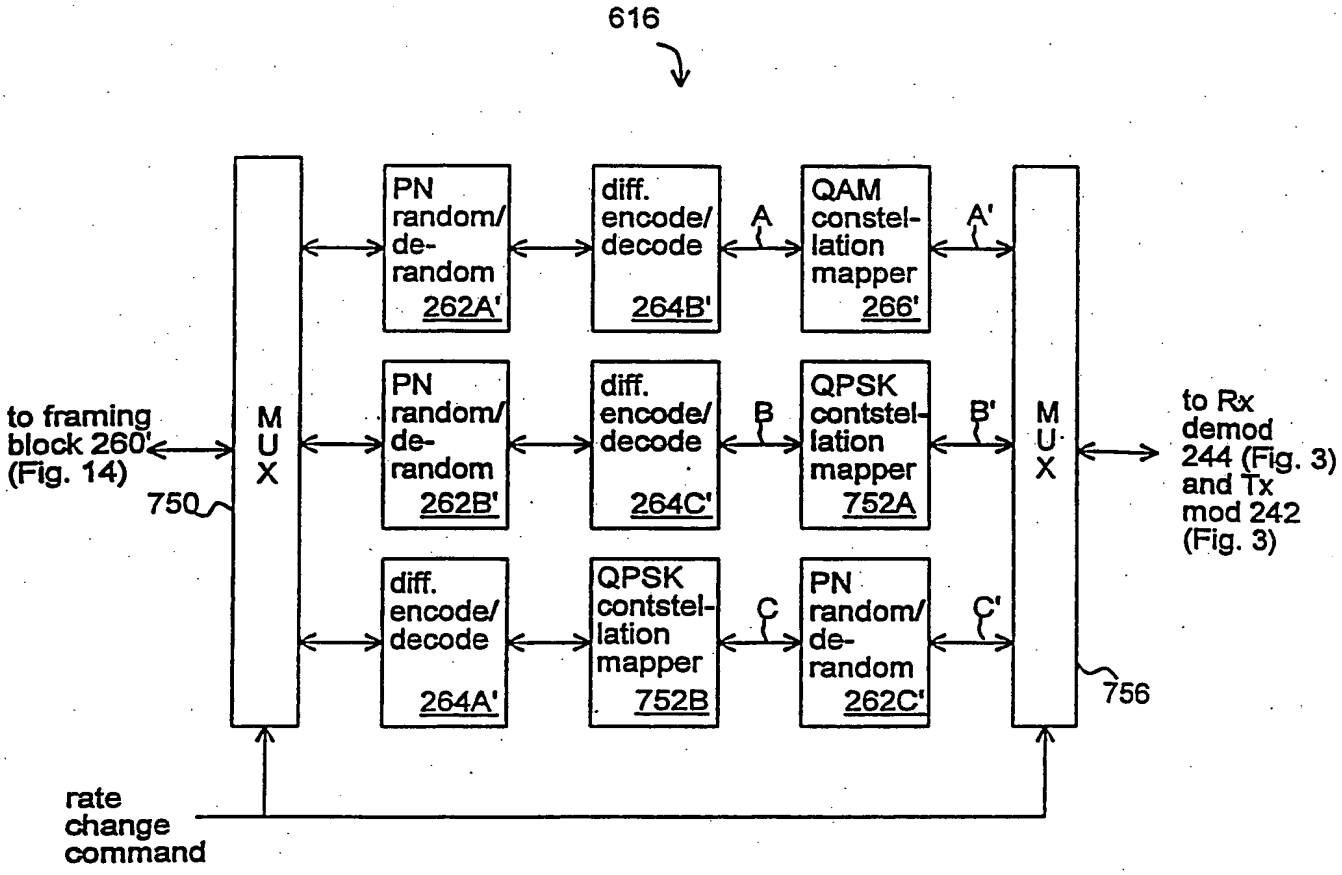

700
encryption tag
sequence number
synch (Willard)
length/ Golay
data
FCS
702
704
302'
304'
306'
308'

FIG. 17



A: data rate = 4 bits/symbol, symbol rate = 27.5 Msymbols (mega-symbols)/second

A': data rate = 4 bits/symbol, symbol rate = 27.5 Msymbols/second

B: data rate = 2 bits/symbol, symbol rate = 27.5 Msymbols/second

B': data rate = 2 bits/symbol, symbol rate = 27.5 Msymbols/second

C: data rate = 2 bits/symbol, symbol rate = 3.4375 Msymbols/second

C': data rate = 2 bits/symbol, symbol rate = 27.5 Msymbols/second

Fig. 18

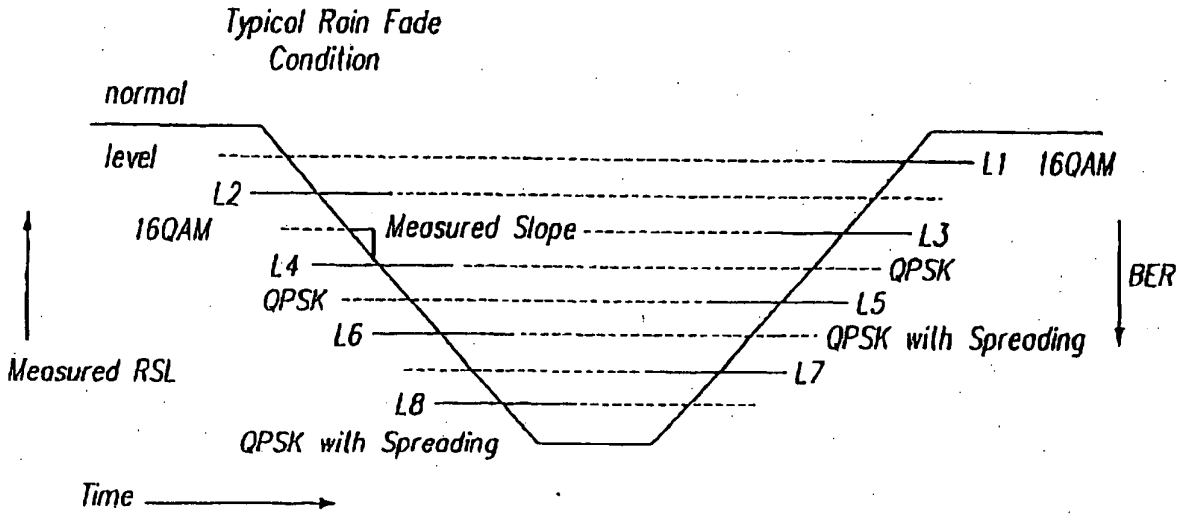

Typical Rain Fade
Condition
normal
level
L2
16QAM
Measured Slope
L4
QPSK
L6
L8
QPSK with Spreading
L1 16QAM
L3
QPSK
L5
QPSK with Spreading
L7
BER
Measured RSL
Time

FIG. 19

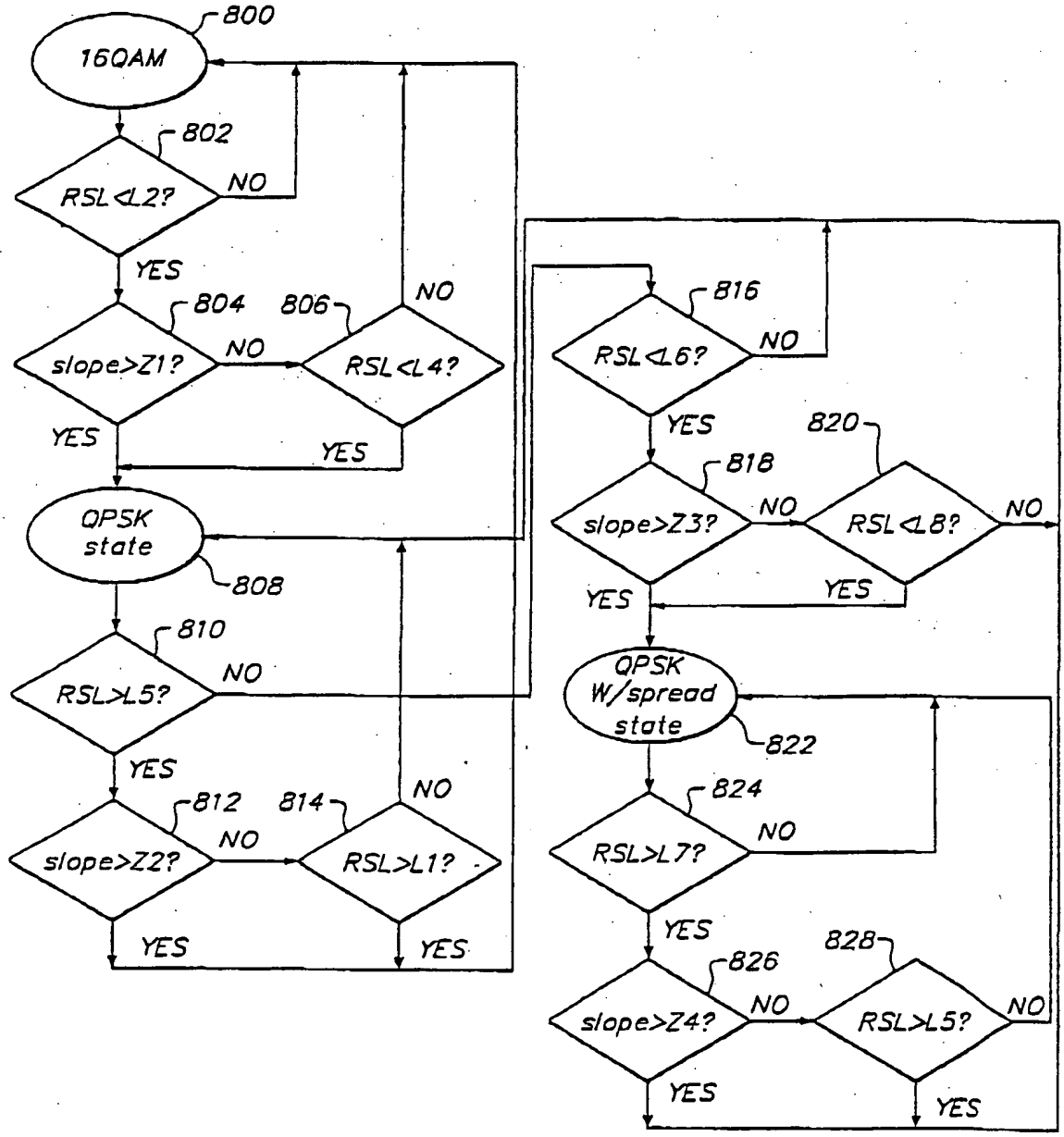

800
16QAM
802
RSL<L2?
NO
YES
804
slope>Z1?
NO
806
RSL<L4?
NO
YES
YES
QPSK state
808
810
RSL>L5?
NO
YES
812
slope>Z2?
NO
814
RSL>L1?
NO
YES
YES
816
RSL<L6?
NO
YES
820
818
slope>Z3?
NO
RSL<L8?
NO
YES
YES
QPSK W/spread state
822
824
RSL>L7?
NO
YES
828
826
slope>Z4?
NO
RSL>L5?
NO
YES
YES

FIG. 20

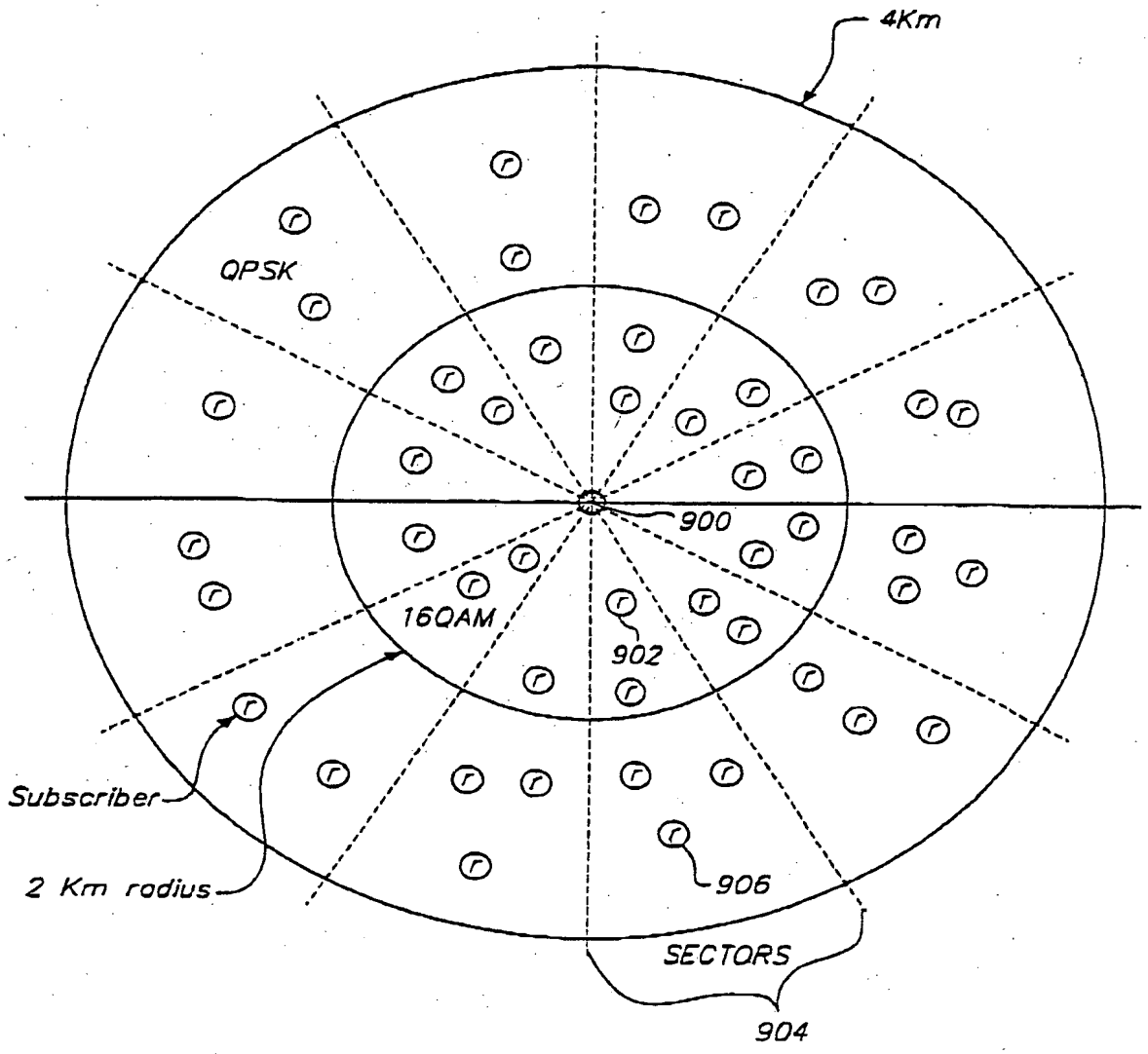

4Km
QPSK
900
16QAM
902
Subscriber
2 Km radius
906
SECTORS
904

FIG. 21

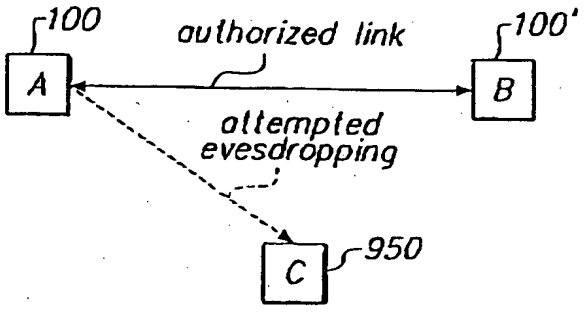

100
authorized link
100'
A
B
attempted
evesdropping
C
950

FIG. 22

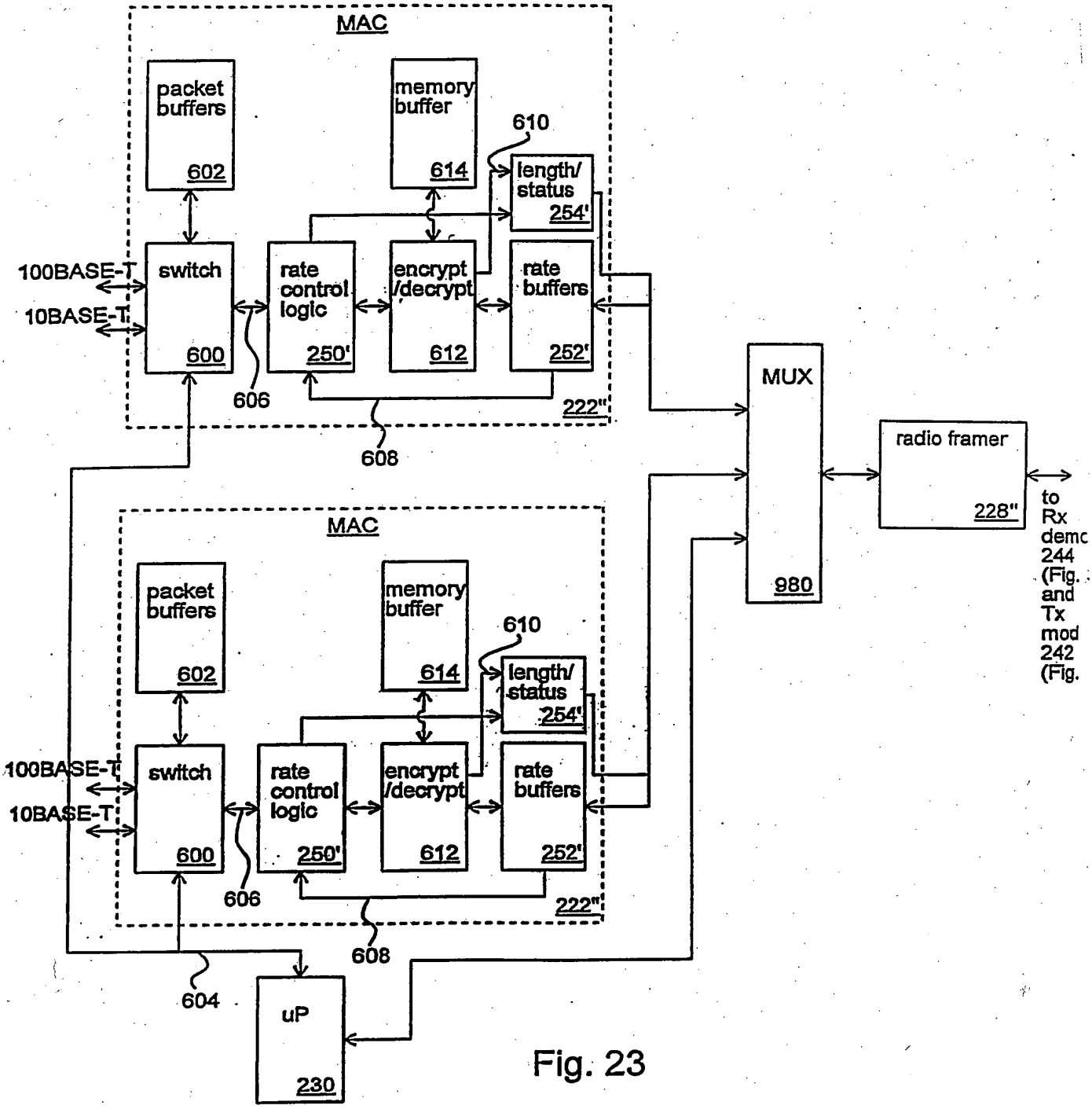

MAC
packet buffers
602
memory buffer
614
610
length/ status
254'
100BASE-T
10BASE-T
switch
600
rate control logic
250'
encrypt /decrypt
612
rate buffers
252'
606
222"
608
MUX
980
radio framer
228"
to Rx demc 244 (Fig.
and Tx mod 242 (Fig.
MAC
packet buffers
602
memory buffer
614
610
length/ status
254'
100BASE-T
10BASE-T
switch
600
rate control logic
250'
encrypt /decrypt
612
rate buffers
252'
606
222"
608
604
uP
230

Fig. 23